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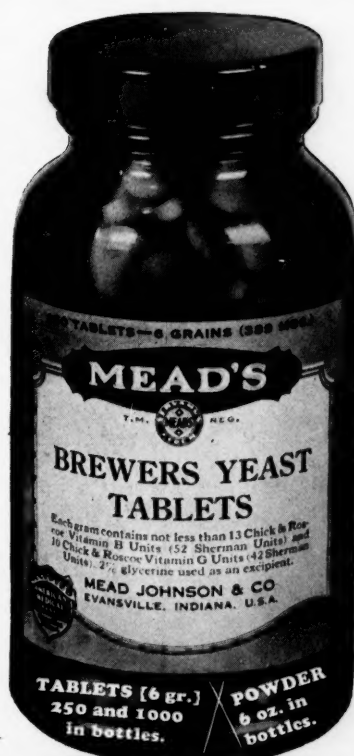
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ORIGINAL ARTICLES

MEDICAL INDICATIONS FOR TRANSFUSION*

By F. H. CHAFEE, M.D.

454 ANGELL STREET, PROVIDENCE, R. I.

The transfusion of blood is not a new procedure. The first instance in American literature was in 1884, by Halstead. He reports an autogenous transfusion for carbon monoxide poisoning, the blood having been defibrinated while without the body. Today, with the improvement in technique, it is a safe procedure, and with most workers causes reactions in less than 15% of the cases. Mortality directly due to the procedure is very rare, indeed.

The indication for transfusion from a medical standpoint is not a clear-cut problem at all. There are many controversial points, and, in the brief time at our disposal this evening, it will be impossible to discuss them thoroughly. So I trust that you will bear with me if some of these points are stated rather sketchily, and it is my hope that further elucidation of these problems may be brought out in discussion afterward. It is my purpose to present no new material, but rather to summarize the literature and to bring to our minds some of the conditions that can be benefited by a transfusion.

We all know that in a case of acute blood loss, a transfusion is a life-saving procedure. The hemorrhage from a typhoid ulcer, hematemesis from carcinoma, hemorrhagic disease of the new-born, all these cases demand blood to preserve life.

In patients with a bleeding duodenal ulcer, there are at present two forms of treatment in common usage. The first—which is commonly employed in this vicinity—is that of ice by mouth, large quantities of morphine, and observation over a period of twenty-four hours or so. Transfusion is given as a last resort. This method results in delayed starting of the Sippy regime. The patient becomes dehydrated from fluid loss, and as a result is restless and uncomfortable. This method is the older of the

two, and dates from the time when transfusions were fraught with danger. It has been replaced in New York, Cleveland, and other teaching centers by the following procedure. Transfusion is performed immediately on a patient who has a blood pressure that is falling, and has dropped below ninety, systolic. If bleeding should recur, transfusion is repeated ad lib. In the meantime, his fluid balance is maintained by hypodermoclyses. We, therefore, have a patient who is getting nothing by mouth, but who is neither restless nor dehydrated, and who is requiring a minimum of morphine. As soon as bleeding is seen to have been definitely checked, the dietary regime is begun. The rationale of this therapy is sound. It is known that, with a severe anemic state, the clot which forms is soft. Intestinal contents may easily dislodge it and renew the hemorrhage. The giving of blood will restore the deficiency of fibrinogen with the result that a better clot will be formed, and the hemorrhage better controlled. The patient thereby can be started on his diet at an earlier date, and he starts it without the handicap of dehydration and anemia that is present in the older form of therapy. In reply to those of you who may feel that transfusion would not stop bleeding so promptly—a case might be briefly quoted. This patient suddenly began to bleed on the tenth day of a previously uncomplicated Sippy regime. He was given three transfusions within the next 36 hours. When he again went into collapse the following day, a diagnosis of pneumonia was made. This was a cause for dispute, and it was with great interest to note at the autopsy that evening, that the artery in the center of the ulcer was firmly clotted. Incidentally, there was no evidence that the pneumonia was embolic in origin.

There are other acute conditions where transfusions can be equally effective. Dana Atchley in his excellent paper describes the syndrome of medical—in contradistinction to surgical—shock. His interest in this condition was aroused by a case in which a patient was bitten in the vein by a rattlesnake, and who was brought into the hospital in severe prostration. Vasomotor paralysis was evident, and the anti-venom serum was not being absorbed. An infusion of saline and dextrose

*Read before the Providence Medical Association
April 1st, 1935.

enabled a blood pressure reading to be obtained for the first time. To give the end result, he recovered after a total of 7200 cc. of fluids had been given by vein over a period of 16 hours. This is the first case described in the literature of a man recovering from an intravenous snake bite.

Much of the picture commonly associated with cardiac failure was present in this man, whose treatment would have resulted in certain death if his heart had really been failing. But the mechanism of this prostration could be more easily attributed to the fact that "his vascular bed had suddenly become larger than his blood volume." This condition Atchley has called medical shock. "In most cases it is a simple process of dehydration with the factors clearly related to the primary disease condition, and with the crucial test of therapy eminently successful." The shining example of this form of anhydremic shock is in the vasomotor failure that may occur in diabetic acidosis. Another factor, however, may be introduced, for Hurlley and Treván in 1916 demonstrated that a drop in blood pressure occurred in cats following the injection of acetyl acetone, and Bauer and Richards in 1928 demonstrated in dogs that acetates have a vasodilator effect similar to histamine. From a toxic approach, the problem, then, is not so simple. Yet it is reasonable to believe that there is a capillary paralysis and that this paralysis can occur from toxins of various sorts, including those of a bacterial nature. The significant effect of vasomotor paralysis, however, is its interference with tissue function, by producing circulatory stasis. Renal function is inhibited, nerve cell metabolism is interfered with, and so forth. Atchley refers to several cases of infectious disease where medical shock was a clearcut complication, and in the words of Janeway, he makes a plea for "no symptomatic treatment without adequate physiological concepts." He says, "We must in most cases abandon the idea of cardiac death at the height of acute infectious diseases, such as pneumonia, typhoid fever, 'cholera,' and other septic fevers. In place of heart failure, we must write vasomotor failure." The treatment of medical shock is independent of the cause, whether due to trauma, toxemia, hemorrhage or anhydremia, for the problem physiologically is the same—namely, a disproportion between the blood volume and the vascular bed. Fifty percent glucose intravenously is the first defense, next large quantities of saline by vein, and lastly, transfusion. Blood will be most effective "in the assumption that

it contains a non-diffusible substance—i.e., serum protein—which gives a more permanent influence." The three treatments are given in that order due to the fact that speed is essential, and hence availability must play a part.

In infection, the effect of transfusion has still some debatable points. Jackson in Boston has recently stated that it is his opinion that transfusion definitely depresses the white count, and so is contra-indicated in a condition where its elevation is demanded. On the other hand, however, we know that in septicemia and bacteremia, medical shock is a distinct possibility, and as already quoted, transfusion is indicated. My own opinion has no weight against such investigators as Jackson, but I have seen the procedure many times to be of distinct benefit.

There is another condition in which transfusion has been recommended and condemned, and that is Agranulocytosis. It was in this condition that Jackson uttered his dictum, by saying: "There seems to be little convincing evidence that transfusions tend permanently to raise the white count, or to stimulate the bone marrow." On the other hand, both O. H. P. Pepper and Hueber feel that transfusions are of benefit. And in Jackson's own series in which Pentonucleotide was used, the mortality of those cases in which transfusion was used was the same as in those cases in which it was not. It is safe to say, then, that transfusions at least do no harm. Those of us who have had patients with this serious and overwhelming disease, feel that anything that might help should be done. Pentonucleotide is not proven in its efficacy, and we give it without stint. Transfusions may help to tide the patient over until such a time as his bone marrow can resume its normal function—and I see no valid reason why we should withhold them.

The place of transfusion in the treatment of chronic disease is important. In rheumatic fever, and rheumatoid arthritis, the resultant anemia may be quite severe. Convalescence in these conditions is notoriously slow anyway, and when a secondary anemia is also present, the patient often stays on the hospital ward for weeks. Beside being of distinct benefit to the patient, I feel that transfusion in these diseases has an economic aspect of interest. Our hospitals are harping on costs these days, and if the attending physicians suggest a transfusion, the cost of the procedure may appear excessive. As a result, the patient is given iron, and continues to lie around. In 1934, the cost per patient per day to

the Rhode Island Hospital was \$4.68, not including that to the community at large, and to the patient himself. A transfusion, which will cost the hospital \$35.00, is then equal to roughly seven days of care. To those of us who have seen patients with rheumatic fever, in an apparently stationary state suddenly improve as a result of a transfusion, one does not have to prove that the procedure is cheaper in the long run. For even though their anemia may not be severe, the uplift gained from this intravenous cocktail is sufficient to slow their pulse, and to stimulate an hematopoietic response. This same argument also applies to convalescent typhoid cases, and to those who are recovering from hemorrhage from a duodenal ulcer.

Chronic cases of carcinoma of the stomach do not often appear on the wards of a hospital. However, the anemia from this condition may be severe, and the patient is often benefited for the time being by small transfusions. The general practitioner is always anxious to do anything possible to care for his patients—and I can say with confidence that I have seen patients in this condition improved symptomatically by small repeated transfusions.

The same regime also may be considered in such chronic diseases as chronic leukemia and Hodgkin's disease. While of course no change in the pathological process will be obtained, symptomatically, there will be improvement. After prolonged treatment by X-ray, patients often become anemic. Radio therapy is, therefore, curtailed. In this situation, a transfusion can be given, which will raise the hemoglobin and red count enough to permit further X-ray therapy. This process can be repeated indefinitely. I have seen it done in several cases with surprisingly good results.

While on the subject of blood diseases, one also thinks of hemophilia and the purpurae. A small transfusion in the former is an accepted form of treatment before an operative procedure, for it will often prevent bleeding for several days. In the latter condition, it may also stop bleeding, and thereby allow a splenectomy to be done under easier circumstances. In those cases in which it does stop bleeding, it at least fortifies the hemoglobin and red count so the patient can stand the operation better. In that queer condition in which the bone marrow apparently lies down on its job—Aplastic Anemia—we have today but one remedy. The basis for the use of transfusions in this condition is in the hope that they will tide the patient over until such a

time as his bone marrow may again resume its normal function.

One more group of conditions will be mentioned. I refer to those diseases in which there is a loss of plasma substance. Nephrosis is a good example. In this disease, as we know, the kidney apparently loses its power of withholding albumen, and this valuable protein is poured out into the urine. In treatment, we try to give the patient a high protein diet. Treatment is not always successful, and transfusions can be given to supplement the diet. I recall very vividly a patient with this disease who was admitted in extremis. Transfusions were resorted to in desperation, and the patient lived. When I last saw her, which was over a year later, she was still coming in every two or three months for more blood. The basic condition in the case still remained, yet from a symptomatic and laboratory viewpoint, the patient was improved.

I shall not dwell long upon the various methods of transfusion, for this will be covered in the next paper. The battle of whole blood vs. citrated blood has been waged for many years, and the percentage of reactions varies with the different writers. The report of R. C. Beck is, I think, consistent with the conclusions of the majority, and the number of transfusions that are given lends a note of sincerity to the result. In 5,908 transfusions of citrated blood, he reports reactions in 29.29%. In 11,094 cases in which whole blood was used, he obtained reactions in only 11.14%. Stetson of New York, in discussing this point, states that there is too much evidence from too many reliable sources to permit of doubt that the use of Sodium Citrate does cause frequent and severe reactions. It is needless to ask, but why should we continue to employ a method which can cause such distressing reactions, when we have an equally effective method which will not? The answer is adequately given by Kordenat and Smithies, who say, "There is no reason why anything but whole blood—i.e., in its most efficient biological form—should be employed in a hospital today."

The symptoms of reaction should be known, and carefully watched for by any person doing a transfusion. Pain in the lumbar region, or a short cough are the first indications of trouble usually. Flushing and pallor of the skin, sweating, dyspnea, cyanosis, falling pulse, dilatation of the pupils follow. The proper procedure is to stop the transfusion immediately. Adrenalin, atropine, and morphine will usually control the situation. It should not need to be

said, but before every transfusion, the bloods should be crossed for agglutination, even though they have been crossed before a previous transfusion. For it is known that patients who have had several transfusions often develop agglutinins that were not present before.

Summary

The beneficial effects of transfusion are obtained:

1. By restoring the bulk of circulating fluid—as in medical shock.
2. In the influence on hemorrhage, and in the provision of material for the blood functions.
3. In rest for and stimulation of the hematopoietic organs.

Lastly, a word of caution is given in guarding against those reactions that occasionally do occur.

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SOME SURGICAL ASPECTS OF BLOOD TRANSFUSION*

By JESSE P. EDDY, 3RD, M.D.

1 SOUTH ANGELL STREET, PROVIDENCE, R. I.

Blood transfusion is one of the oldest weapons of the healing art. The ancient Egyptians made many references to it in their writings. Pliny and Celsus saw fit to condemn it. In the *Metamorphosis* of Ovid¹ we have, "Why now do ye hesitate and do nothing? Unsheath your swords and draw out the old blood that I may fill the empty veins with the blood of youth." In 1492 not only was Columbus credited with his famous discovery of America, but one of the very earliest recorded transfusions failed to save the life of Pope Innocent VIII. In the words of Villari,² "The vital powers of Innocent VIII rapidly gave way. He had for some time fallen into a kind of somnolency which was sometimes so profound that the whole court believed

him to be dead. All means to awaken the exhausted vitality had been resorted to in vain when a Jew doctor proposed to do so by the transfusion, by means of a new instrument, of the blood of a young person, an experiment which had hitherto only been made upon animals. Accordingly the blood of the decrepit old Pontiff was passed into the veins of a youth whose blood was transferred into those of the old man. The experiment was tried three times and at the cost of the lives of three boys, probably from air getting into their veins, but without any effect to save that of the Pope. He expired on the 25th of April, 1492. Another version³ contradicts this tale, saying that the three boys were bled until they died and the Pope drank a draught prepared from this blood without benefit."

Jean Denys, physician to Louis XIV, is given the credit for having performed the first successful transfusion of blood in man. In June 1667⁴ he injected the blood of a calf or lamb into the veins of a young man dying from repeated venesections. The patient survived and apparently recovered his health. Violent controversies arose regarding the operation and it was decreed that for the future no transfusion should be made on the human body except with the approbation of the Physicians of the Faculty of Paris.

In 1669 Richard Lower of England performed the first direct transfusion of blood from one animal to another.

Then followed a considerable period when little or no advance was made in this field. Transfusion was again in vogue during the Franco-Prussian War but later fell into disrepute.

In 1892⁴ Prof. von Ziemssen reported on the first syringe method of blood transfusion. In the beginning he injected whole blood subcutaneously followed by vigorous massage. This procedure was not without pain especially as he used from 300-450 cc. of blood at an injection. He reported an improvement in hemoglobin of from 10-15% with no fever and no hemoglobinuria in these cases. Next he devised the method of syringes. He inserted a needle into the vein, withdrew a syringe full of blood and injected it through a needle already inserted into the vein of the recipient. He advised at least three syringes of a capacity of 25 cc. so that while one was being filled and one being emptied the other one could be cleaned out with sterile salt solution. Following the intravenous infusion he occasionally noted a rise of temperature and a chill, but in no case was there hemoglobinuria. There was no

*Read before the Providence Medical Association April 1st, 1935.

evidence of hemolysis and no free hemoglobin was found in the blood serum. He encountered no phlebitis or secondary thrombosis and he found that the needle could be stuck into the vein again at the same place. He always had a number of needles ready, and his average transfusion was from 200-300 cc. Von Ziemssen first raised the question whether often repeated transfusions in the bad progressive anemias might have a use, and suggested the possibility that by those means a real cure might result in some cases.

Carrell⁸ and Crile in the early 1900's added much new interest with their successful methods of end-to-end suture of blood vessels and subsequently multitudes of cannulae and methods of suture were devised. The chief objections to these methods were the inconvenience to which the donor and patient were put, the technical difficulties involved, and the difficulty in estimating the amount of blood transferred.

Following closely behind these direct methods came the indirect ones, namely, those transfusions in which the blood while being transferred from donor to patient comes in contact with the walls of a syringe, needle, receptacle or canula. Paraffin coated walls were utilized in many of these to prevent clotting of the blood and the method of Kempton and Brown was foremost among these.

In April 1913, Lindemann, in a paper read before the New York Academy of Medicine, resurrected and elaborated upon the practically forgotten method of old Prof. Von Ziemssen of Germany and the multiple syringe method of Lindemann came into considerable favor. More recently still Unger, Scannell, and many others have devised ways and means whereby only one syringe is needed in a transfusion.

While all these efforts were being directed toward the perfection of instruments whereby blood might be transferred rapidly from donor to patient without clotting, three workers, * * almost simultaneously in 1915 reported upon a chemical, sodium citrate, which, when added to blood in the right amount, prevented clotting.

Thus we are taken up to the present day where we still speak of the direct and indirect methods of transfusion but not with the same meaning as that of twenty years ago. Then a direct transfusion was just what it said, an arterio-venous connection between donor and patient. But today when we speak of a direct transfusion we mean a whole blood transfusion, directly given by means of a closed

system, unexposed to air. The old term indirect transfusion has come to signify chiefly citrate transfusions with all that the term implies.

The performance of a blood transfusion is a surgical act and physicians doing this type of work should be familiar with the various methods in vogue today; the advantages and disadvantages of these methods; the indications and contraindications for transfusion; the dangers associated with the transfusion of blood. These aspects of blood transfusion concern every man who now or at any future time may be confronted with this problem of transfusing blood.

The present day methods of blood transfusion are, broadly speaking, divided into two camps—direct and indirect, defined previously. Each system has its ardent advocates, and the battle of which is better has been waging for the past twenty years. I should be at fault not to briefly sum up the evidence pro and con. Probably the foremost advocate of citrated, indirect transfusions in this country is Richard Lewisohn, surgeon to the Mt. Sinai Hospital, New York City, who in 1915 was one of the three authorities who independently and practically simultaneously introduced this method to the medical world. He has recently written that¹⁰ "unquestionably a chill following a transfusion may be a serious complication. In many instances transfusions are given to patients who are very ill. In such a case one should employ the method that produces the least number of chills. On this basis a careful clinician may prefer non-citrated blood." He and his co-workers, by dint of centralizing transfusion work in their hospital, by eliminating every possible source of foreign protein from their distilled H₂O and instruments have reduced post-transfusion reactions from 20% to 1.2% in the citrate series and from 6% to 0.7% in the whole blood direct series. Thus we have it on the highest authority and under the most rigid precautions that citrate transfusions produce **at least twice** as many unfavorable transfusion reactions as that of direct whole blood.

Minot writes "infants with certain chemical abnormalities of the blood may be harmed by transfusion of citrated blood even when no incompatibility or allergy can be demonstrated." Beck¹² quotes Rhodes of the Rockefeller Institute for Medical Research as saying, "In this hospital, where we deal with many blood dyscrasias of severe degree, we are opposed to the use of citrates in transfusion. Our method is that widely used in New York City employing whole blood transfused by means of

Unger Needles and a series of 20 cc. Record syringes. We feel that this is the simplest, most fool-proof, most efficient technique so far devised." Beck closes his paper by saying "that it would seem reasonable to assume that blood the shortest time outside the body, to which no foreign substance is added, which does not have an opportunity to become chilled nor to be exposed to the air, and which comes in contact with a minimum of foreign substances, all other things being equal, will give the most consistent and satisfactory results in all types of cases."

Of the citrate method, Bernheim wrote, "For the practitioner in the small community with no one skilled in the giving of whole blood, the citrated method is certainly the one of selection. But when you have refinements that go with hospitals and someone capable of giving whole blood it is only reasonable to use this method."

There are many different good methods for carrying out the direct transfusion of whole blood. One of the simplest and quickest which has stood the test of time, is the so-called Lindeman method which is so flexible that it may be as easily and quickly performed in the home, the hospital room or operating pavilion. Its only disadvantage, if such may be called the case, is that it requires one doctor and a nurse familiar with its technique, and another doctor to assist the transfusionist. Preferably all three should be well versed in the procedure.

The advantages of this method over all other methods, direct and indirect, are these:

1. *Speed.* There is no other method of blood transfusion which permits a wider latitude of speed than this one. The fastest transfusion necessary in emergency cases for extreme shock from hemorrhage may be quickly run off, or a slow, measured transfusion, necessary in bleeding ulcer cases can be as easily provided. While the blood is being collected and citrated in the citrate method the whole transfusion may be completed with this system.

2. *Simplicity.* There is no highly ordered machinery or elaborate equipment necessary to perform a transfusion by this method. Six syringes, two Unger or Lindeman needles with a few in reserve, three basins of sterile saline, two tourniquets, two doctors and a nurse familiar with the technique and a transfusion may be performed. No valves to depend upon or watch; if one syringe gives trouble it may be discarded without notice; no rubber tubing to throw off its foreign protein,

just a steady succession of syringes carrying blood from donor to patient as directly and quickly and with as little change in the blood as is humanly possible to attain.

Other direct methods today in use are numerous and include the Kempton-Brown paraffin tube system which some think to be the most satisfactory one yet devised. It is good and sure in familiar hands, but has the disadvantage that a vein must be cut down upon and sacrificed with every transfusion in addition to the fact that the blood must be collected in eight minutes and discharged into the patient in four more if danger of clotting is to be avoided.

Unger, Scannell, and other similar inventors have contributed their share to the cause of direct whole blood transfusion but none of them match in simplicity and rapidity and dependability of performance the marvelous technique of Lindeman, the foundation of which was laid down so many years ago by Von Ziemsson of Germany.

The medical indications for transfusion have just been given. The chief surgical indications for transfusion are hemorrhage and shock, and in building up a debilitated patient for and supporting him after a major operation. No elaborate discussion of these need be undertaken here.

Suffice to say that from a surgical standpoint the transfusion of blood is often a life-saving procedure and should be available night and day at a moment's notice, in home or hospital, with equal facility and surety.

In 1920, Dr. Pemberton of the Mayo Clinic wrote an article which appeared in the Iowa State Journal of Medicine and has been widely quoted since, in which he said:¹⁴ "The operator should be conversant with all the dangers associated with the transfusion of blood. He should exercise judgment in advising the procedure and he should be conscientious in the selections of donors. The application of this valuable therapeutic measure must not be undertaken without a careful consideration of all the dangerous complications which may follow. The procedure is very often considered only a simple intravenous medication or a minor operation, while in reality its potential dangers place it with the major operations."

This statement is equally true today and no one should undertake the performance of a blood transfusion without a knowledge of the causes and prevention of post-transfusion reactions, few as they may be.

These¹⁵ reactions may be divided into two main classes—hemolytic and proteolytic, according to Stetson. "Hemolytic reactions are those resulting from incompatibility between the bloods of patient and donor due to mistakes in grouping or to the presence of minor iso-agglutinins within the known groups. We must also include in this class the reactions occasionally seen after transfusions of individuals suffering from certain pathologic conditions in which there is a very active hemolytic agent at work. These are not constant but may rarely occur in such conditions as pernicious anaemia, purpura, hemolytic jaundice, leukemia and sepsis. This type of reaction can be neither foreseen nor avoided but the possibility of its occurrence should be kept in mind so that prompt measures may be instituted to counteract its effects should it occur. Only recently I transfused a small boy with a severe progressive anaemia, using 150 cc. of whole blood from the father. The reaction was very favorable. One week later he was again transfused in like manner with the same amount of blood from the father. At the finish of the transfusion the child's face became flushed, then paled, the pulse and temperature rose rapidly, vomiting set in and subsequently hemoglobinuria and bloody diarrhea were added to the picture. The child was controlled with injections of morphine and adrenalin chloride and cleared up in 24 hours time. Re-examination of the bloods revealed them to be perfectly compatible by all known tests."

Compatibilty tests should be performed by the transfusionist himself. Lindeman found that his post-transfusion reactions were increased 26% when he allowed others to do the blood testing for him. A convenient and satisfactory method is to draw 5 cc. of blood from the vein into a test tube. Defibrinate by whipping with a stick. Centrifuge, pipette off serum, wash cells with normal saline. Recentrifuge, discard, wash saline and add fresh saline to make a 50% suspension. Place 2 drops of undiluted serum on a slide and add to it one small drop of red cell suspension which we wish to test. Rock slide back and forth in a good light against a white background. Incompatibility is manifested by macroscopic clumping. The reaction should be watched for a period of 30 minutes in case of doubt.

Test sera should be of high titre so that the reaction will be rapid and complete.

The indiscriminate use of universal donors is to be condemned because of the not infrequent reports of alarming and even fatal reactions occurring as

a result of their use. Landsteiner¹⁸ is of the opinion that donors of the homologous group are preferable.

Proteolytic reactions embrace three distinct types:

1. Febrile reactions with or without chills and unaccompanied by any other symptoms.
2. True protein reactions of sensitization as evidenced by the dermal reactions of erythema and urticaria.
3. Anaphalactoid reactions.

The early recognition of the signs which point to these reactions followed promptly by the administration of adrenalin chloride 1-10,000 in 10-15 minim doses will frequently alleviate them. A history of asthma or hay fever or any protein sensitization should always be inquired into and fasting donors used in cases of this type. It is also well to use different donors on subsequent transfusions in these cases.

Last, but not least, the danger of transmitting disease is possible through a transfusion. Asthma, malaria, measles, smallpox and syphilis are among the diseases that have been contracted through the transfusion of blood.

This brings us down to the donor problem, the concern of every physician interested in blood transfusion. It has come to be more widely recognized that a controlled, dependable source of good donors is necessary in order that the best type of transfusion work may be done in a community.

In 1928, with the financial assistance of the Rockefeller Foundation and the New York Academy of Medicine, the Blood Transfusion Betterment Association of New York, the first of its kind in the world, was established, founded for the purpose of supplying blood donors, of known type, health and fitness, at a moment's notice and for a small fee. The need for such an organization has always been great.

In communities lacking some such system relatives and friends must be used for donors and much time must necessarily be wasted in testing their bloods, sometimes hours being lost before a compatible donor is found. Furthermore, such a relative or friend cannot undergo the necessary tests to rule out disease and show the good quality of his blood. Much must be left to chance. Far better to be able to call a donor whose type is known to be that of the patient, whose physical condition is one hundred per cent and whom you know will

(Continued on page 155)

THE RHODE ISLAND MEDICAL JOURNAL

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EDITORIALS

THE VIRTUOSO PHYSICIAN

Your character is what you are, your reputation is what is said about you. The former is known to the *cognoscenti* and your fellows, the latter is what is said about you. It is obvious that true evaluation is far less easily learned than the far less reliable hearsay evidence. This is by no means to be ignored for it is evident that many persons are, through their ignorance, unable to originate the sentiments regarding doctors and medical matters which one hears so frequently. Even physicians have much

difficulty in verifying reports which often bear the stamp of professional propaganda. It is often of interest to know how some matters of popular medical interest find their way about. Startling cures, unusual operations, which often are every day hospital matters, unusual claims as to "uncanny diagnostic ability" frequently find their way into the popular mind through some methods which are both curious and unprofessional. Now there can be no doubt but that some physicians, through unusually large experience, acquire a justly large reputation for their skill. It is eminently proper that it should be known from having had the experience of hundreds and even thousands of cases of a special and peculiar nature. Not long ago this column urged

that those who were particularly well equipped in experience and apparatus for bronchoscopy should be better known. It is extremely gratifying to know that this important step in our medical status has been accomplished. It is eminently proper that those who are particularly interested in special problems should "advertise" in this Journal. Specialism has come to stay and both profession and public should be able to refer to our pages for the quick selection of physicians who may be had in emergencies. But we have no particular use for anyone who subsidizes any individuals or group to tout for custom. It has often been said that "good wine needs no bush," but in a forest who can find that particular bush where the life-giving fluid may be found? There is no reason why in addition to these pages the Medical Library should not be called upon to furnish information of this kind and there is every reason why professional cards should appear in this Journal to a far greater extent than now prevails. The very rapid growth in the numbers of the medical profession in this state makes such a course important and imperative. And it should be the function and duty of the R. I. Medical Society to investigate and admonish breaches of professional ethics and custom which are so rampant at the present time. The exigencies of our present economic status have brought forth many practices of arrant charlatanism which are most dismaying to thoughtful physicians. Indiscriminate serology in the hands of those who have no scientific experience or background, promises of cure and the claiming of special skill vie in irrationalism with the absurd claims of the cults and lend them a strength to which they are not entitled. When one praises a brother physician he praises himself and forges one more link in the chain which should band a sacred professional brotherhood.

THE DOCTOR IN POLITICS

As a matter of general policy the shoemaker should doubtless stick to his last and the surgeon to his scalpel, the doctor to his doses, and the physician to his pill.

Nevertheless circumstances do arise which make it wise and even necessary for a member of the medical profession to enter public life. Boards of health and health commissions must be manned by experts. Schools must have their examining physicians and in various other ways the doctor in his

professional capacity is needed for public as well as private practice.

When, however, it comes to matters of party politics and non-medical political jobs the position of the medical man at once becomes questionable. He cannot serve two masters and if he attempts to combine political office holding with private practice both interests will suffer. Like the doctor who tries to build up his fortune in the stock exchange or in real estate, his patients will suffer, his professional zeal will dwindle, and in the end he may find that he has sold his birthright for a mess of pottage.

Rhode Island has in the past had occasion to be very proud of her medical men serving as experts in public office. The work of these men has been far removed from political machinations. Let us hope that in the future the fair name of the profession will continue to be brightened by the professional efforts of those members who are called to serve the public.

SOME SURGICAL ASPECTS OF BLOOD TRANSFUSION

(Continued from page 153)

answer the call in a relatively short period of time. The Blood Transfusion Betterment Association of New York has over twelve hundred donors on the active list and supplies donors for approximately 500 transfusions each month, a most successful, high type organization. The Providence Medical Association has recently established a counterpart in Providence and its facilities are now being used by the physicians of this city and state.

In conclusion, I have summarized the development of transfusion and discussed the present day status of methods.

The direct whole blood transfusion of Lindeman is the procedure of choice.

The causes and prevention of post-transfusion reactions have been discussed.

Blood donors should be organized and regulated under medical supervision.

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MEASLES IMMUNIZATION*

By D. L. RICHARDSON, M.D.

SUPERINTENDENT OF C. V. CHAPIN HOSPITAL

This subject is worthy of serious consideration, not only because of its importance but also because of the multiplicity of methods now employed.

Immunization against measles was first discovered in 1918 in this country and Europe almost simultaneously, and altogether independently. It was found that an injection of serum obtained from the blood of a patient recently recovered from measles would usually prevent the disease. The immunity, of course, was a temporary immunity, but even so its value, if once found to be feasible and reliable on a large scale, would be a life saving measure even though it would have little or no value in preventing outbreaks of the disease, except, perhaps, in institutions caring for children.

Following its discovery convalescent measles serum was tried out rather extensively in Europe, certain South American countries, Japan, and in this country. The findings of those who first employed it were confirmed and it has been used rather generally, primarily to protect young children among whom the fatality rate is high. That this is true is well shown in the mortality statistics of the United States Registration. In 1930 there

were 3,820 deaths from measles. Of these deaths 3,294 were in children under 5 years of age, and 526 in persons 5 years and over. Of the 3,294 deaths 2,354 were in children under the age of 3 years and 1,877 under the age of 2 years. This clearly shows that measles is most fatal during the first 2 or 3 years of life. It is in this age group that the immunization against measles is of the most value and when employed is of real public health value.

It is true that the fatality of measles is very low, about 1% or less. This rate varies considerably from one outbreak to another, and in recent years has been very low. Subsequent outbreaks may be quite severe, with the fatality rate well above 1% in the community, and in infant asylums the rate has been as high as 25%.

Since the original work on measles immunization was done, several modifications have been employed and quite recently an entirely new kind of immunization has been tried out. It is of interest to discuss these various methods.

When first introduced only the serum of blood taken from convalescent measles patients was employed, the blood being taken within a month or such a matter, of the acute attack. It was believed that at this time there would probably be a maximum of anti bodies in the blood and subsequent practical experience over a period of years has borne this out.

In order to demonstrate what convalescent human blood serum will accomplish when used on a fairly large scale, an experience in Providence over ten years ago is noted. It was decided that because of the difficulty of obtaining blood donors to limit the use of serum to children under 3 years of age. In the early work with measles anti-serum, 10-15 cc. of serum was used. To still further conserve the available serum it was decided to use only 6 cc. It was further determined that so far as possible its use would be confined not only to children under 3 years of age but also to these only after exposure to an older child in the family or other definite and known contact. Before the outbreak was over it was found necessary to use it in certain institutions to which measles had gained entrance. It was, however, intended to be a community experiment and under conditions which would be difficult enough to show its real value.

The preparation of the serum was done at the Chapin Hospital. Great care was exercised in the

*Delivered before the Providence Medical Association May 6th, 1935.

selection of donors. At the very beginning the serum of one donor proved to be valueless because subsequent information indicated that he probably did not have measles. So far as possible donors were confined to convalescent patients in the hospital, from adults or adolescents, if possible.

The blood was with aseptic precautions drawn into a sterile flask and allowed to clot at room temperature. It was then put into a water bath for one-half hour to shrink the clot to squeeze out contained serum and put in the refrigerator over night. Next morning the clot was removed and the serum clarified by centrifuging. It was then put up in 6 cc. doses in rubber stoppered glass vials. 1% phenol was used as a preservative. The blood of each donor was given to Wasserman test and each batch of serum tested for sterility.

Realizing that the serum of different donors varied in its antitoxic value it was proposed to pool all the serum. Because of the constant demand for it this was not possible, and only about one-third of the serum was pooled.

In the community the serum was administered by family physicians. They were asked to fill out a card for each case and to make a final report as to whether the serum was effective or not. They were also urged to give it as early as possible after the child had been exposed and preferably during the first week of the incubation period.

During the outbreak about 650 vials of the measles anti-serum was distributed to practicing physicians and detailed reports were received of the results of its use on 550 children. 418 children were entirely protected and in only 27 instances was the exposure uncertain. 132 children contracted the disease. In 66 of these cases the disease was very mild, mild in 53 and unmodified in 13 instances. There were no deaths.

In the 132 cases in which the serum failed to protect entirely the first possible exposure was determined in 114 instances. In 58 instances the serum was given within the first 7 days after the first exposure, and in 67 cases it was given at a later date, even after the disease had begun. The administration of the serum failed in 24% of the children to entirely prevent them from having measles, although in many more instances the disease was much modified. The percentage of failures was lowest in children 1 year and under, when it was 18%, and 17.8% at the age of 2 years. It was less effective in older children up to 40%, or 50% in children over 6 years.

To show what the serum accomplished in institutions for children the following results were observed in one infant asylum with a capacity of 250, in which the children were all under 6 years. 186 children were given convalescent serum of which 99 did not develop measles, while 87 were not protected. There were 9 deaths, a fatality rate of 5%. In previous outbreaks the fatality rate had reached 25%.

From the experience in the use of measles convalescent serum in this epidemic, certain conclusions were reached:

1. That it was a life saving measure in children under 2 or 3 years of age by preventing or modifying the disease.
2. That it is useful in controlling outbreaks of the disease in child caring institutions.
3. That the dose 6 cc. was probably quite large enough.
4. That the immunity was not lasting but will tide over an outbreak small children until the next outbreak when they are older and the disease is less serious to life.
5. That the disease is infectious no matter how abortive the attack really is.
6. That the donors should be in good physical condition and have had a recent frank attack of measles.
7. That the serum from several donors should be pooled.
8. The serum can be kept sterile for a month or such a matter without a preservative if kept in a refrigerator.
9. That there are no unpleasant reactions except slight swelling and tenderness at the site of injection.
10. That it is difficult to secure enough donors because so few adults contract the disease in an outbreak and because bleeding of children is not satisfactory because of the small yield, and parental objection.

This is a fair sample of the results obtained with convalescent measles serum used as a temporary immunizing agent. In some places the results have not been as good but it is rather generally agreed that it is quite an efficient method.

The next in efficiency and feasibility is the use of whole blood of recent convalescents. It is equally efficient and if the physician is familiar with intravenous work it is a simple procedure. As a usual thing an older child comes down with the disease first and exposes a baby or younger child in

the family. By the end of the first week of the incubation period of such exposed children, and sometimes even earlier, the older child has sufficiently recovered so that withdrawal of 15 or 20 cc. of blood will do no harm. The blood can then be injected immediately into the muscle of the outer aspect of the thigh of the exposed child. This is being done, particularly by some pediatricians. The difficulty is to get the blood early enough to use on the secondary cases. Even though the disease is not prevented it may be modified. There is little danger of infection and no unpleasant general reactions.

Owing to the difficulty of obtaining convalescent serum other means of producing temporary immunity have been tried out. Soon after the value of convalescent measles serum was demonstrated the serum from adults who had the disease in childhood was employed. It was found, however, that as much as 20 cc. of serum was required to obtain good results and these have not been very constant. The anti body content of the blood so long after the disease is so much decreased that it is not very efficient.

More recently McKahn of the Children's Hospital in Boston and his colleagues have prepared a placental extract for inducing temporary immunity against measles and with encouraging results. So far it has not been used widely enough to judge of its value. Recently there has been found to be quite unpleasant reactions from the commercialized product, so much so that one company has withdrawn it from the market. What little it has been used in Providence has not been very successful but the experience is too limited to pass judgment. Should this method prove to be effective and free from reactions it would supplant all others because it can be commercialized and should not cost as much as human serum which can't be commercialized.

While immune serum produces only passive immunity attempts have been made to produce active immunity by administering it late in the incubation period from the 7th to the 10th day. The idea is to modify the disease and yet not prevent it and in this way a lasting immunity could be expected. This practice is followed by some physicians with some success. The chief difficulty, however, is that it is not always possible to determine the exact time of infection from which to date the incubation period. Where the primary case is in the house this is possible with considerable degree of accuracy but when the exposure is outside the home this is either impossible or at least difficult. When feasible this is good practice for there is reason to believe that

even the mildest attacks with or with no eruption will produce a lasting immunity.

Measles has not in this vicinity recently been a serious disease. The outbreak in 1931 and 1932 was very extensive in Providence, there being about 9,000 cases with only 22 deaths. The present outbreak really got started in early March, and has also been very mild. To May fourth, 1,903 cases have been reported and this includes 279 cases occurring in 1934 and so far only 1 death has occurred. The next outbreak may be severe and even the present one may increase in severity before it terminates.

Another factor in the low fatality rate is that great pains are taken to see that every case is seen by a physician and the family urged to furnish good nursing care.

The local physicians are calling for convalescent serum faster than it is possible to supply it, and as yet we do not know how many small children have received prophylactic injection, but there is reason to believe that this has also been a real factor in keeping the fatality rate so low.

One very good test as to the value of measles convalescent serum is the fact that the practicing physicians are still calling for it although about 15 years have passed since it was first employed in the city.

SOCIETIES

RHODE ISLAND MEDICAL SOCIETY

The regular quarterly meeting of the Rhode Island Medical Society was held September 5, 1935, at the Pawtucket Memorial Hospital upon the invitation of the Board of Trustees of that institution.

The meeting was called to order by the President, Dr. Roland Hammond, at 4 P. M.

The minutes of the annual meeting having been published, it was voted to omit the reading of the same.

The President announced the deaths in August of two Past-Presidents of the Society: Dr. John W. Keefe and Dr. Julian A. Chase.

The terms of the officers of the Board of Classification, Dr. D. L. Richardson and Dr. N. S. Garrison, having expired, the President reappointed both of these Fellows for a term of three years each.

The President urged the Fellows to send to the Chairman of the Committee on Change of By-Laws, Dr. A. T. Jones, the return postal cards indicating their preference as to the type and number of meetings of this Society in the year.

The following program was presented:

1. "Report of 1935 Sessions of the American Medical Association," Guy W. Wells, Delegate to the A.M.A.

2. "Aputrid Pulmonary Necrosis with Presentation of Case," Jacob Greenstein, from Medical Service of the Memorial Hospital. Discussion by J. F. Kenney and E. W. Benjamin.

3. "A Case of Uremia with Presentation of Specimens," K. M. Barr, from Medical Service of the Memorial Hospital. Discussion by J. F. Kenney, Guy Wells, F. G. Taggart.

4. "Some Surgical Conditions of the Large Intestine with Presentation of Cases," Frederic V. Hussey. Discussion by F. A. Cummings.

5. "The Doctor Looks at the Cults," Charles L. Farrell. Discussion by J. F. Hawkins and K. M. Barr.

On motion of Dr. Mowry, duly seconded, a rising vote of thanks was extended to the Board of Trustees and the staff of the Pawtucket Memorial Hospital for their courteous invitation to the R. I. Medical Society to hold this meeting at the Hospital.

The meeting adjourned and a collation was served.

Respectfully submitted,
J. W. LEECH, *Secretary*.

IMPORTANT NOTICE

WORKS PROGRESS ADMINISTRATION

205 BENEFIT STREET, PROVIDENCE, R. I.

To: Medical Societies, Hospitals, Physicians, Surgeons and Licensed Practitioners:

The Works Progress Administration, Mr. J. Burleigh Cheney, Administrator for Rhode Island, pursuant to established rules and regulations of the United States Employees' Compensation Commission, Washington, D. C., is directed to communicate to all Medical Societies, Hospitals, Physicians, Surgeons and Practitioners in the State of Rhode Island, the desire of this Administration to solicit the full co-operation of the profession for the care and treatment of W.P.A. workers who, due to accidents, suffer injuries in the performance of their duties, necessitating medical treatment. The Commission particularly stresses that such injury shall be of a traumatic nature, and no treatment is authorized except as indicated.

Definition of Injury

The term "injury" means only traumatic injury by accident causing harm or damage to the physical structure of the body and shall not include disease in any form except as it shall naturally result from such injury.

Authorization

It is provided that all medical and hospital treatment and services shall be engaged and authorized in the following manner: Form CA 16- (request

for treatment, which includes on the reverse side, physician's report) shall be accompanied by form S 69- (voucher for services and supplies of Hospitals and Physicians) when injured worker is presented for treatment, and may be waived in emergencies, to be supplied at the earliest possible moment thereafter, as bills cannot be paid in the absence of such written authority.

Fees, Services and Supplies

The Commission has agreed with representatives of the National Hospital Association on basic rates with general hospitals for services to Works Progress Administration employees, and will pay medical fees at rates not in excess of the minimum charge prevailing in the community for similar services.

Bills for Services and Supplies

A separate voucher must be submitted by each payee for services to each injured employee.

Vouchers from physicians and hospitals on form S 69- should be submitted when the employee is discharged from treatment, except when treatment or hospitalization extends more than thirty (30) days, in which case voucher S 69- should be rendered at the end of each thirty (30) day period, with a complete report from the attending physician.

Voucher S 69- should be verified by the signature of the injured employee.

Hospitalization will be paid for the day of admission but not for the day of discharge from hospital. Vouchers should be prepared accordingly.

Hospitals and physicians must not submit a voucher comprising the services of both. When a physician is owner or part owner of a hospital, a separate voucher should be prepared for each class of service.

In preparing voucher form S 69- care must be taken to meet the following requirements: All charges must be itemized to show specific dates on which treatments were given, and the charge for each, and a concise description of the injury for which services were rendered.

X-ray charges should be itemized so as to show the dates on which made, number of views, parts of the body X-rayed and the charge for each service. Charges for X-ray cannot be paid unless properly itemized.

X-ray plates or films should not be forwarded to the Commission unless specific request is made therefor.

The Works Progress Administration, through its State Compensation Officer, invites inquiry from the medical profession so that a clear, workable understanding may be had. The prompt payment of all obligations, by the Commission, will be facilitated by prompt and regular statements for services rendered.

Yours very truly,

PHILIP B. DUFFY,
State Compensation Official

COMMENTS UPON MEDICAL TOPICS

By MALFORD W. THEWLIS, M.D.

Iodo-Bismuthate of Quinine in the Treatment of Syphilis. Oliver, *N. E. J. of Med.*, 7: 1, 1935, believes that this form of bismuth may be superior to bismuth salicylate.

* * * *

Aspirin Test in Rheumatic Conditions, Wolf, Mt. Sinai Hospital, N. Y. C., *N. Y. State J. of Med.*, 18; Sept., 1934, gives aspirin to patients suffering from rheumatic pains. The negative response to this dose (pain) is the deciding factor and governs the recommendation for removal of foci.

* * * *

Factors Influencing Sedimentation Rate of Erythrocytes. Thomas H. Cherry, *J. of Lab. and Clin. Med.*, 3: 257, 1934, gives his opinions. To rely on this test alone, without other laboratory data, is unwise. The test alone is confusing and as a prognostic aid it is of slight help. The leucocyte count or filament-nonfilament study in conjunction with the clinical picture is of much greater aid than the sedimentation rate. (It makes some difference, too, which method is used to do the test.—T.)

* * *

Roentgen Therapy of Hyperparathyroidism. Merritt and McPeak, *Am. J. Roentgenology and Rad. Therapy*, 1: 72, 1934, report six cases of bone disease which have been either entirely cured or definitely benefited by roentgen therapy over the parathyroid region. The facts point strongly to the etiological role of parathyroid disfunction in cystic bone disease and to the efficacy of roentgen therapy of the parathyroids in such lesions. (This condition should be suspected in patients who fracture easily. A fractured hip without much injury might easily result and it is encouraging to see results with the roentgen ray.—M. W. T.)

* * * *

Neoplastic Lesions of the Accessory Sinuses and Orbit. William L. Clark, *Med. Record*, May 1, 15 and June 5, 1935, shows that electro-coagulation can now be numbered among the effective methods designed for the removal of operable primary lesions of the accessory sinuses and orbit. Success is materially increased by the post-operative employment of radium or X-ray, the preference being given to radium.

* * * *

Advantages of Intensified Oral Cholecystography. Stewart and Illick, *Am. J. Roent. and Rad.*

Therapy, 5: 624, 1935, give a technic based on three factors: (1) Increasing and fractioning the total dose of tetraiodophenolphthalein. (2) The free administration of sugar preceding and during the roentgen examination. (3) The use of a fast Potter-Bucky diaphragm and an exact exposure technic.

* * * *

Occurrence of Common Duct Stone Following Gall Bladder Operation. Hermanson and Goldowsky, *N. E. J. of Med.*, 18: 806, 1934, show that there is a relatively high incidence of common duct stones following gall bladder operations and their presence may be accounted for in one of several ways: (1) Failure to discover and remove stones in the common duct at the time of operation. (2) Formation of stones within the common or hepatic ducts. (3) Descent of intra-hepatic stones. (4) Escape of stones from gall bladder into common duct at the time of first operation. (Frequent attacks of pain and jaundice lasting two or three days are very suggestive of common duct stone. Diphasic blood bilirubin suggests obstruction.—M. W. T.)

* * * *

Elongation of the Red Blood Cells in a Jewish Family. Pollock and Dameshek, *Am. J. Med. Sc.*, 188, 822, 1934, believe that it is possible that oval, elongated and sickled red cells and sickle cell anemia represent various gradations in the same abnormality of red blood cells. The most important factor in the pathogenesis appears to be that of heredity. (Racial characteristics of red blood cell abnormalities are seen in Cooley's anemia in Mediterranean races and sickle cell anemia in negroes.—M. W. T.)

* * * *

Syphilis of the Bladder. Fuat Kâmil, *Ztschr. f. Urol., Leipzig*, No. 3, 1935, 29: 163. This observer states that syphilis of the bladder may occur in any stage of the disease but gumma is the most frequent type seen. Papillomatous gummata may be found.

* * * *

Allergic and Infectious Factors in the Pathogenesis of Gonorrheal Polyarthrititis. S. Genkin and W. Ljachowsky, *Deutsches Arch. f. klin. Med., Berlin*, April 8, 1935, 177: 420. These authors believe that there are two factors in the pathogenesis of gonorrheal arthritis, allergic and infectious, and that the two may act simultaneously or alternately in different stages of the disease.